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P.02

Docket No.: 01 P 17780 US  
App. No.: 09/965,375

**DECLARATION**

As a person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: 18<sup>th</sup> July 2007



FULL NAME:

Philippe Vandermersch

TOTAL P.02

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## EXHIBIT A

INVENTION (INV) DISCLOSURE

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INTELLECTUAL PROPERTY  
DEPARTMENT (IPD)  
SIEMENS CORPORATION  
186 WOOD AVENUE SOUTH  
ISELIN, NJ 08830

<b>RECEIVED</b>	
<b>THIS SECTION FOR IPD USE ONLY</b>	
<b>RECEIPT DATE STAMP</b> <b>JUN 20 2001</b>	SIEMENS DOCKET NO <u>2001E1130145</u>
INTELLECTUAL PROPERTY DEPT. WEST CLASST	IP ATTORNEY <u>DDC</u>

- TITLE Method for Background Noise Reduction and Performance Improvement in Voice Conferencing
- PURPOSE AND PROBABLE FIELD OF USE OF THE INVENTION

3. PLANNED USE IN PRODUCTS: [REDACTED] (Siemens ICN internal) and Product

4. LIST ALL WRITTEN DESCRIPTIONS OF THE INVENTION ([REDACTED])

5. DATE(S) INVENTION WAS CONCEIVED [REDACTED] DATE(S) INVENTION WAS EXPLAINED TO WITNESS(ES)  
DATE(S) EMBODIMENT(S) OF THE INVENTION WAS CONSTRUCTED [REDACTED]  
DATE(S) EMBODIMENT(S) OF THE INVENTION WAS TESTED [REDACTED]

6. ATTACHED IS A DETAILED DESCRIPTION COMPRISING 4 PAGES

7. INVENTOR

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SOC.SEC.NO. [REDACTED]

DATE 4/8/2001

SIGNATURE 

8. CO-INVENTOR, IF ANY

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DATE 6/8/2001

SIGNATURE 

(Use an additional form for more co-inventors)

9. WITNESS: Witnessed and understood by:

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DATE 6/12/2001

SIGNATURE 

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10. DID ANY WORK CONCERNING THE INVENTION ARISE IN THE COURSE OF ANY CONTRACT? no IF YES, IDENTIFY:

11. WAS ANY WORK CONCERNING THE INVENTION DONE IN THE COURSE OF OR UNDER ANY GOVERNMENT CONTRACT OR SUBCONTRACT? no IF YES, IDENTIFY:

THIS INVENTION DISCLOSURE IS COMPANY PROPERTY AND IS AVAILABLE ONLY TO AUTHORIZED PERSONS. THE CONTENTS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED IN ANY MANNER, IN WHOLE OR PART, EXCEPT IN ACCORDANCE WITH ESTABLISHED APPROVAL PROCEDURES.

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8. CO-INVENTOR

PERSONAL INFORMATION: Mr. ☐ Mrs. ☐ Ms. ☐

FULL NAME

ADDRESS

CITIZEN OF

COMPANY INFORMATION:

NAME

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ADDRESS

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SOC. SEC. NO.

DATE

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9. WITNESS: Witnessed and understood by:

NAME

TEL. NO.

DATE

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COMPANY INFORMATION:

NAME

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**Invention Disclosure Form Supplement**

1. Title: Method for Background Noise Reduction and Performance Improvement in Voice Conferencing over packetized networks.

2. Abstract:

This Method provides a comprehensive solution for voice media mixing in conferences over packetized networks.

When mixing voice streams from multiple participants in a conference call it is desirable to reduce the background noise within the conference call as well as reduce the computational resource requirements.

An additional requirement for conferences over packetized networks is that no participant may have his own voice stream or components thereof feed back from the mixer to him. Any such feedback would be perceived as a strong echo due to the delay on packetized networks.

The proposed method chooses a low number (e.g. 3) of loudest voices that are mixed. This mix of the loudest voices is fed to the quieter voices (not the loudest). Each loudest participant receives the mix of the other loudest (e.g.2) participants.

3. Background Information

a. What is the problem solved by your invention?

- 1) Reduce background noise in conference calls with  $n > 3$  participants and therefore allow conference calls with a large number of participants with no quality degradation.
- 2) Significantly reduce computational resource requirements in conference calls with  $n > 3$  participants.
- 3) Ensure that no participant receives a stream that contains his own voice to avoid the occurrence of echo due to the delay in packetized networks.

b. What techniques prior to your invention were used to perform the function of your invention?

- 1) Output to each participant the gain corrected sum of all voices.
- 2) Output to each participant the gain corrected sum of the voices of all other participants.

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3) Output only the loudest speaker to each participant.

c. What are the disadvantages of these prior techniques?

1) Prior technique (1) was acceptable in circuit switched networks where delays are low and participants can not hear their own voice due to the compensation by the human communication channel and brain (In some such systems simple gain adjustments are used to keep any echo low).

In an environment where voice is transported over a packet network the delay is larger and participants can now hear their own voice which is recognized as a disturbing echo. This echo is too strong to be removed using normal echo cancellation and this would be computationally very expensive as the echo tail would be quite long (> 60-160ms).

2) Prior technique (2) adds in addition to the voice of active participants the background noise for "silent" participants. The voice quality therefore decreases with the number of participants.

3) Prior technique (2) is computational expensive because it is necessary to n time add (n-1) voices.

4) Prior technique (3) has as voice quality that is perceived to be insufficient. Especially in conference calls with high interactivity the switchovers between the participants are deemed to be disturbing.

d. What are the advantages of your invention over the prior techniques?

1) Reduction of computational resource requirements.

2) Improvement of sound quality by reducing the background noise.

4. Detailed Description

a. Detailed structural and functional operation:

Definitions: n – number of participants in conference

x number of loudest packetized voice streams (e.g. 3)

A voice packet is recorded voice for a short period of time (e.g. 125ms or 4ms, PCM).

A sample algorithm would:

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- 1) Find  $x$  loudest voice streams by using a voice energy estimation over past and current packets. (E.g through a voice energy estimation through a Infinite Impulse Response Filter (Order 1) with a time constant in the order of 100ms to identify the loudest speakers).
- 2) Mix the  $x$  loudest voice streams (e.g. by adding the packets of the 3 loudest voice streams and adjusting the gain). This results in one output packet.
- 3) Send the output packet with the mix of the  $x$  loudest voice streams to all  $n-x$  participants that didn't originate one of the  $x$  loudest voice streams.
- 4) For each of the  $x$  participants who originated one of the  $x$  loudest voice streams mix the packets of the  $x-1$  other loudest voice streams. (So we have  $x$  output packets, one for each participant who originated one of the  $x$  loudest voice streams)
- 5) Send the appropriate output packet to each of the  $x$  participants who originated one of the  $x$  loudest voice streams.

This sample algorithm would be run in a loop over the period of the conference continuously re-computing the loudest speakers.

**Example:**

A, B and C are the 3 loudest and N are the rest of the participants in the conference call. The following example shows what each participant would hear:

	Output to A	Output to B	Output to C	Output to N
Input A		X	X	X
Input B	X		X	X
Input C	X	X		X
Input N				

- b. Are there alternative methods or different structural embodiments of your invention? Can the general idea or technique of your invention be extended to other related fields? How?

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The sequence in which the sample algorithm works is for illustration only. The sequence can be varied.

Alternate embodiments could for example change the number of outputs to each of the loudest speakers:

	Output to A	Output to B	Output to C	Output to N and D
Input A		X	X	X
Input B	X		X	X
Input C	X	X		X
Input D	X	X	X	
Input N				

D would be the fourth (x+1) loudest speaker.

c. Which features are believed to be new?

- 1) Mixing x loudest voice streams of n participating voice streams in a conference.
- 2) Reducing the computation for a conference with n participants from n times mixing n-1 voice streams to mixing x loudest voice streams and x times mixing x-1 voice streams.
- 3) Reducing the number of mixed loudest voices to a very low number that takes into account the behavior and attributes of the human communication system and brain (Cybernetics). The number can be as low as 2, with 3 giving the impression of a full conference.

d. Set forth the preferred embodiment for your invention.

The preferred use of this is in a Multipoint Conference Unit (MCU) in an IP based communication system. The MCU provides a central conferencing resource that contains voice stream mixing capability. In such an MCU resources are precious and at the same time voice quality is of great concern.

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*Walt J. J. J.*

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## EXHIBIT B

You do not need to prepare any of the formal filing documents; we will prepare all such documents and file the application. What you do need to prepare along with the application are:

- An Information Disclosure Statement (IDS) and PTO Form 1449;
- A set of claims and an Abstract suitable for filing with the European Patent Office (EPO); and
- A copy of the application, EPO claims, EPO abstract, IDS and PTO

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